UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
9311 GROH ROAD
GROSSE ILE, MI 48138

MEMORANDUM

SUBJECT: Discussion of Variation of Minnesota Pollution Control Agency and US EPA Vapor Intrusion Screening Levels for the General Mills Site

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DATE: 4/28/2014

STATEMENT OF THE ISSUES

On February 29, 2012, it was recommended that the EPA's screening value of 4.3 $\mu g/m^3$ TCE be used for screening soil gas samples at the General Mills site. Currently MPCA is using 20 $\mu g/m^3$ in soil gas (sub-slab) as a decision point for installing vapor intrusion mitigation system for homes. RPM Evison requested an explanation of why US EPA and Minnesota Pollution Control Agency (MPCA) use different values and if the MPCA decision point of 20 $\mu g/m^3$ is considered protective.

DISCUSSION

The US EPA determines probability of a non-cancer detrimental health effect to occur by calculating a hazard quotient (HQ). The HQ is a ratio of a single substance exposure level over a specified period of time to a reference dose of the same substance derived from a similar exposure period. It is recommended that the HQ of an exposure to a chemical of concern be below or equal to 1 which is the level at which no adverse human health effects are expected to occur. For cancer risk, the US EPA recommends a screening level that would equate to an exposure to a chemical that would increase the excess lifetime cancer risk (ELCR) (or chance of getting cancer over a lifetime) by one in a million ($1x10^{-6}$) or greater. However, rates up to 1 in 10,000 ($1x10^{-4}$) are considered acceptable action levels. It is also important to note, that a screening level is not an action level. Generally, if the concentration of a compound is within or below US EPA's risk range of 10^{-4} to 10^{-6} ELCR, no action would take place. A screening level is just a number which tells the agency that more investigation should be done. The Office of Solid Waste and Emergency Response (OSWER) suggest that a removal action takes place if ELCR exceeds a 1 in 10,000 or the HQ exceeds 3.

Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. The vapor intrusion pathway is considered complete when the vapors move from the source (or groundwater contamination) through the deep soil and subsurface soil gas, and into a structure. Each of these components must exist in order for the pathway to be considered complete.

US EPA determines indoor air screening levels based upon a person being in a home for 24 hours a day, 350 days per year for 30 years. Each step in the vapor intrusion pathway has a different screening level calculated from the indoor air screening level. It has been found that the concentration under a building (subslab) would have to be ten times greater than the indoor screening level to reach that screening level inside the home.

The US EPA screening level for TCE in indoor air is 0.43 $\mu g/m^3$ based upon a 1 in a million ELCR. The acceptable cancer risk range would be 0.43 $\mu g/m^3$ to 43 $\mu g/m^3$ for indoor airThis would equate to a TCE concentration in the subslab soil gas of 4.3 $\mu g/m^3$ to 430 $\mu g/m^3$. It is important to note that an HQ of 1 would be exceeded if indoor air concentrations of TCE exceed 2.1 $\mu g/m^3$ (21 $\mu g/m^3$ in the subslab soil gas).

The MCPA decision point of installing vapor intrusion mitigation systems at subslab soil gas exceedances of 20 $\mu g/m^3$ is consistent with US EPA policy of protecting human health from TCE exposure through vapor intrusion. It is equivalent to an indoor air concentration that is within EPA's acceptable risk range for cancer risk and also meets EPA's recommended cleanup level for non-cancer risk.